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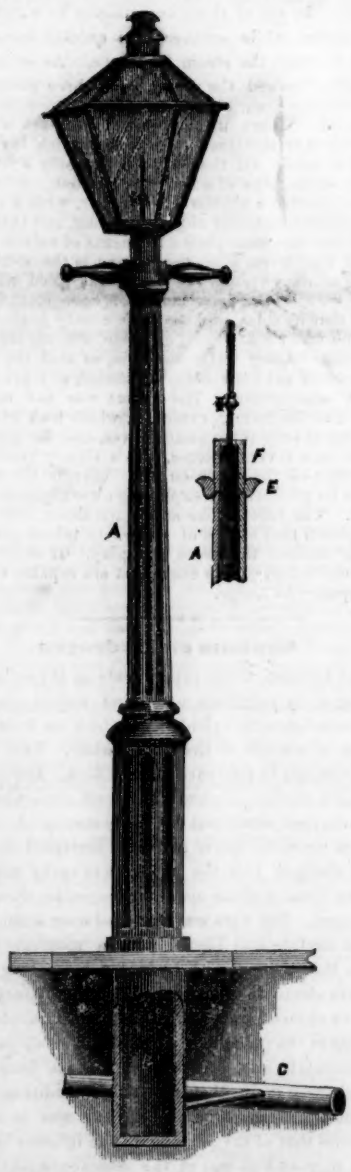
Graham's Patent Lamp Post.

Things which have always been known and used just as they were originally gotten up for the special purpose they were intended, and generally crude and



expensive in construction and operation from the nature of the case, sometimes gain the attention of a mind capable of realizing the advantage of improvement, and at the same time ingenious enough to make the improvement, and thereby make a thing so much more complete and valuable, that a greater demand is at once made for the article—mankind are benefitted and the lucky inventor is often made both famous and rich.

Something of this nature is the invention which the accompanying engraving will give a clear idea of, and known as Graham's Patent Lamp Post. The post has the usual exterior form, but differs materially in the interior arrangement. It will be observed that the post, A, is constructed with all the openings in base, B, closed so as to be perfectly gas tight. The upper part, shown in fig. 2, is fitted with a cast iron stopper, F, secured and leaded in the flange, E. This stopper is drilled to receive a short piece of half inch pipe, to which the stop-cock and burner is attached. The base of the post, B, is drilled and tapped five inches above the closed bottom to receive the service pipe, as shown proceeding from the street main, C. The service pipe is connected with a running thimble, or other union, and the gas is let on at the base, thereby dispensing with the upright pipe inside the post. The advantages of the improvement are manifest, and secures the following important ends. It prevents freezing up in any climate during the severest winters; it avoids the liability to choke up with dirt, water, or condensation in the pipes, and gives a receptacle for all impurities. It will, therefore, give more light and a better light with the same burner. As a point of economy in construction we have a saving of ten or more feet of gas pipe, and its subsequent renewing.

It is far more durable, because oxidation can take place only on the outside. It requires less attention in keeping the pipes and burners clean, owing to the condensing chamber or base retaining all impurities.

This improvement may be applied to old posts now in use, at a trifling expense. This post has been thoroughly tested the past winter at the West, and has given great satisfaction in every particular. We take pleasure in recommending it to gas men generally, and especially to manufacturers of lamp posts, etc.

For further information, address JOHN W. GRAHAM, Patentee, Chillicothe, Ohio.

Farmer's Patent Dumping Barrow.

The accompanying engravings, figs. 1 and 2, illustrate an improved barrow, which will commend itself to all who have ever used and been annoyed by the imperfections of the ordinary hand-barrow, for transporting materials by manual power.

The distinguishing characteristics of this barrow are—it is strong, simple and efficient; the load is nearly all carried on the two large main wheels, only a small portion, except in the act of dumping, is allowed to bear on the small wheel, B, in front. This enables the workman to move a much greater load, as he has not to carry nearly one half of the load on his arms, as with the common barrow. By a gentle pressure downward on the handle at rear, the front wheel, B, will be raised a little from off the ground, and in this position it can be very readily turned either to the right or left about. By lifting at the handles the body, C, will turn freely forward on the two pivots, as shown by fig. 2, and the load will be dumped over the front wheel, B.

Fig. 1.

FARMER' PATENT DUMPING BARROW.

It will be found to be far superior to any barrow yet introduced for gas works in carrying the lime, oxide of iron, coke, coal, or any other material, through the narrow passages and doors generally found in purifying and retort houses; also for mines, coal yards, granaries, gardens, factories, lime and coke kilns, railroads, canals, etc.

Numbers of these barrows of different sizes may be seen working at the Manhattan Gas Works, 18th street station, North river, or 14th street station East river, New York city.

Patented March 16, 1869, by William Farmer. For State and county rights, or for further information address Herring & Floyd, 740 Greenwich street, New York city, or the patentee at the Manhattan Gas Works, 18th street station, New York city.

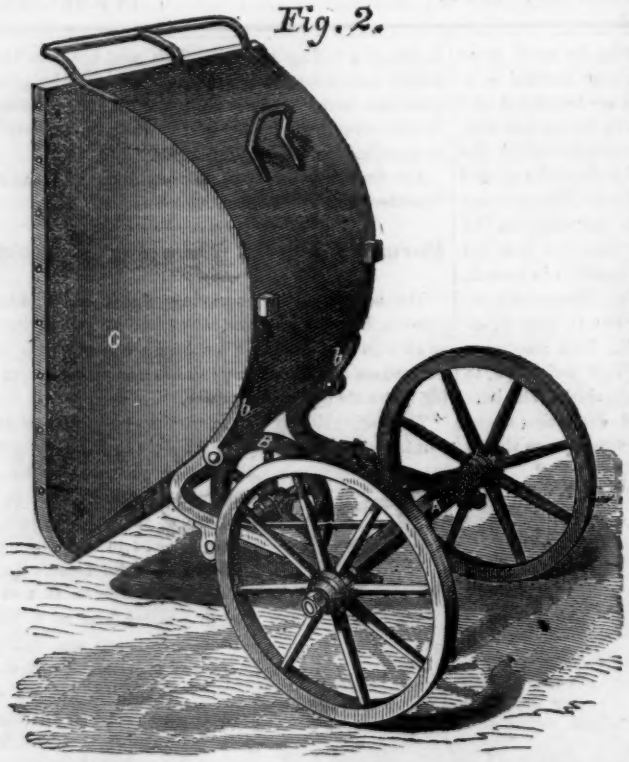
☞ *For figure 2 of Farmer's Patent Dumping Barrow see next page.*

The Effect of Mineral Oils.

BY PROF. A. OTT.

Herr Grotowsky, at a recent meeting of the Society for the advancement of the manufacture of mineral oils, in Halle on the Seale, Germany, made some remarkable communications on a new property of photogenic hydrocarbon oils discovered by him. In exposing various kinds of such oils to the influence of light by means of glass baloons, he invariably found that they absorbed oxygen and converted the same into its allotropic condition, ozone. It was found that the air was even ozonized in well-corked vessels, the effect being to some degree also dependent upon the color of the glass. The respective results, after three months' trial were marked down. Before enumerating them, it is, perhaps, appropriate to remark that by "photogen" oils from peat or bituminous coals, are meant those which distill between a temperature of 212 and 550 degrees Fahrenheit, and which are of a specific gravity of from 0.795 to 0.805. The term "solar oil" is given by the Germans to oils having a specific gravity of from 0.830 to 0.835, and distilling above the temperature of 550 degrees Fahrenheit. The former are burned

Fig. 2.



FARMER'S PATENT DUMPING BARROW.

in lamps adapted to that object, and the latter in argand or carcel lamps.

The observations of Herr Grotowsky were to the following effect:

1. Photogen and solar oils stored in barrels and cisterns lined inside with iron remained free from ozone, and their burning was faultless.

2. Photogen and solar oils kept in baloons of white glass, wrapped up in straw, showed traces of ozone, but burned well otherwise; both the color of the oil and that of the cork were found to be slightly changed.

3. Photogen and solar oils in baloons of white glass which were painted black, exhibited traces of ozone, but the oils were less changed than by experiment No. 2. The corks were not bleached.

4. Solar oil and photogen in unwrapped and white glass baloons which had been kept in the open air gave very strong indications of ozone, burning very badly, charring the wick, and nearly extinguishing the flame after burning for six or eight hours. The solar oil was turned to a decided yellow, and showed an increase of 0.003 in its specific gravity.

5. Solar oil which had been exposed to light in unwrapped baloons of green glass also gave strong indications of oxone, but, though the wick charred, it burned well. The color had been but little changed.

6. Solar oil in green baloons, painted black, was shown to contain some ozone: it burned however, perfectly well.

7. Solar oil in green baloons wrapped in straw gave indication of traces of ozene; it burned like the former. Color slightly bleached.

8. American kerosene from petroleum which had been exposed to the light in white and unwrapped glass baloons, had become strongly ozonized, so much so that it scarcely burned. The originally bluish white oil had assumed a vivid yellow color, and the specific gravity was found to have increased to 0.095.

9 American kerosene which had been kept in the dark for three months did not show any ozone, and burned perfectly well.

These experiments were made by exposing the oils tested from April to July, 1868. Those who had become strongly ozonized smelt very differently afterward and the corks had become bleached as if attacked by chlorine, while those of the unaltered oils had remained unchanged. Though the experimenter favors the opinion that the oxygen of the air, in being absorbed by the oil, and converted into ozone, does not affect any chemical change, but remains simply absorbed, it cannot be seen why such oils should deposit carbon when burned. They should on the contrary burn better. There is only one way possible, by which we may account for the decrease in the illuminating power, viz.: The ozone seizes a part of the hydrogen and forms water therewith, while a higher carbonated oil remains. Vohl, a German chemist, expressed the opinion years ago, that the depositing of soot is invariably caused by an admixture of carbolic acid. If this is taken for granted, it would have to be admitted that a part of the hydrocarbon is directly oxidized by the ozone. This, however, is impossible, as any chemist, will admit who is acquainted with the chemical constitution of carbolic acid. A ready means for ascertaining whether a photogenic hydrocarbon oil will deteriorate in time or not is found in the property of nascent chlorine gas to act in the same manner as ozone, such action, however, taking place in a much shorter space of time. In order, then, to test the oils, it is necessary to measure equal quantities, say ten ounces of it. Take as many flasks as you have samples of oil, cover the bottom of each, when flat, to the height of one-tenth of an inch with black oxide of manganise, or take such other quantities as may be convenient, being careful that the amounts are the same.

Then add enough hydrocloric acid to cover the manganise to twice the height indicated Finally, fill the flask with the oils and set them on a heated sand bath, or in some other warm place, until the generation of gas ceases. Now separete the oils from the residual manganise, and shake them well with warm water before subjecting them to the burning test.—*Journal of Applied Chemistry.*

Familiar Science.

Sound is usually produced by the vibration of some sonorous substance, which vibration produces motion in the air, called sound waves, which strike upon the drum of the ear—precisely as when you throw a stone into still water a series of concentric waves is produced which roll outward in every direction. Sound travels in the air about thirteen miles a minute; it travels much faster through a solid medium, as iron for instance. In a perfect vacuum there could not be any such thing as sound. If a cannon should be fired in a perfect vacuum, it would give no report. Sound can be heard much farther in a cold day than a warm one, for the reason that the air is denser in cold weather. The report of a pistol is much louder in a valley than on a mountain for the same reason.

Why are copper and iron sonorous, while lead is not? Copper and iron are hard and elastic, while lead is neither, and is therefore not sonorous. Steel is harder and more elastic than iron, and is therefore more sonorous. It is so much so that most large bells are now made of that metal.

Why is not pure copper used in making bells? Because the addition of a small quantity of tin and zinc makes it harder and therefore more sonorous. Hence the composition known as bell metal.

Why can we not hear as distinctly in misty or snowy weather as in a clear day? Because the air is not of uniform density; the particles of water or of snow obstruct the sound waves. It is for the same reason that partition walls in houses should be filled with shavings or sawdust, when we do not wish the sound of voices or any other confusion to pass through from one room to another.

Why do shavings or saw-dust prevent the passage of sound? Because they present different *media* of various densities for the sound to traverse—first the rare medium of the air of the room; second, the dense medium of lath and plaster; third, the rarer medium of saw-dust and shavings, then the lath and plaster and air again. This change of medium has a wonderful effect in diminishing the force of sound waves.

When the vibrations are less than sixteen in a second of time a continuous sound cannot be communicated to the ear. Sixteen vibrations of a musical chord is therefore the lowest musical or definite sound which can be communicated; any less number of vibrations produces nothing but a succession of hoarse sounds or jars, which convey no idea of harmony. Now how *great* a number of vibrations is the ear capable of appreciating? The books tell us (and man has been able to very accurately measure them), that "The human ear is capable of appreciating as many as 24,000 vibrations in *one second* of time; and consequently is able to hear and distinguish a sound which lasts only the twenty-four thousandth part of a second!"

Boiler Explosions.

Mr. Heaffman, of Breslau, publishes a description of some experiments recently made in accordance with the request of the Association of German Engineers. He used a small glass boiler, and found that when the escape pipes were only gradually opened, and the steam allowed gradually to escape, the generation of steam quietly continues, and the water remains pretty tranquil. But if, on the contrary, the valve is quickly opened, steam bubbles suddenly form all through the water, and rising to the surface place the water in violent commotion. In one of these experiments he watched the manometer, while another man quickly opened the valve to allow the steam to escape. As soon as the valve was opened the pressure fell three pounds, but immediately again began to rise, whereupon the boiler exploded. Where it had been in contact with the water it was shattered to powder, which lay around like fine sand. Of the entire boiler only a few small pieces, of the size of a thaler, were left. Afterwards he constructed a similar glass boiler, with a cylinder seven inches diameter nine inches long, and to the ends metal bottoms were placed by means of vulcanization; in the ends were pipes for letting in the steam. By means of a force pump the boiler was filled with boiling hot water, the valve being left open meanwhile, in order that its sides might become evenly heated Then half the water was drawn off again, and air let in, and then more boiling water forced in, so that the air was compressed until the boiler exploded, at a pressure of fifteen atmospheres. The report was not nearly so loud as at the former explosion, which took place at a pressure of only three atmospheres, and the glass only broken into several pieces. This clearly proves that the action of the water on the boiler is the same as would be produced by exploding nitro glycerine in the water. The effect is like an electric shock, and he is of the opinion that escape of electricity taking place during the issue of the steam is in play. If steam be led into cold water, shocks ensue that are capable of bursting pipes.—*Exchange.*

Graham on Hydrogen.

Prof. Graham, in his experiments on the occlusion of hydrogen by palladium and other metals employed, besides the metallic cylinders of which we have before spoken, *wire* made of the same metals. This was, at least, the case in reference to palladium. The decrease of density in the cylinders which took place when they were charged, could not be easily measured. But a wire of the same was so markedly increased in length when charged, that the change was easily measured, and the density of the metal hydrogenium thencefrom calculated. The wire was stretched over a finely graduated surface and loaded with a moderate weight. It was then charged with hydrogen by making it the negative electrode of a small Bunsen's battery. The positive electrode was a thick platinum wire, placed by the side of the palladium wire, within a tall jar of dilute sulphuric acid. An exposure of an hour and a half charged it so that no farther addition to the amount afterwards took place. Tnis was in volume 936 times that of the palladium. The increase in length of the wire—which was at the commencement nearly twenty-four inches long—was about ⅝ inch. The density of hydroginium was by this means found to be 1.708; and several experiments gave nearly similar results.

The Aniline Colors.

In the year 1856, a young English chemist, experimenting with some of the products derived from coal tar, discovered a new dye of unexampled brilliancy and beauty. Though the fact that Aniline in certain combinations assumed a beautiful blue or violet color had not escaped the notice of previous experimenters, the credit of rendering an aniline color available as a dye, is due without qualification to Mr. W. H. Perkin. The discovery of mauveine by him laid the foundation of an entirely new branch of industry, which within the brief interval that has elapsed has expanded itself with a rapidity without precedent. Very probably the chemist himself, when conducting his experiment, had no presentiment of the consequences it involved. Already is the industrial revolution he was then virtually working an accomplished fact. No sooner was Mr. Perkin's discovery made known than it riveted the attention of chemists in every country. A whole army of experimenters in England, France, Germany and the United States, immediately commenced to prosecute further investigations into the subject, and with such energy and effect that presently fresh discoveries and inventions were announced with bewildering rapidity.

The zeal with which theoretical experimenters cultivated the new field was, however, more than rivaled by the eagerness with which, in manufacturing industry, each discovery, as it was made, was seized upon and rendered subservient to practical ends. Curiously enough, the original inventor was not the first to bring the new dyes into commerce. It cost him two years of effort before he succeeded in establishing the manufacture of the new material in his own country. In the meantime, he was anticipated by French chemists and manufacturers, who, availing themselves of the process revealed in the English patent, at once began to produce the new dye.

One who only considered the state of the industry at this time in the two countries, would have said that the invention belonged to France, and had only be imported into Englond. While, however, the honor of the original invention belongs to England, the credit, not only of acheiving the first great industrial success, but also of making the next important advance in the way of invention, cannot be denied to France. Aniline red was first produced in Lyons, in 1859, a date distinguished by the sanguinary victories in Italy, from one of which the new dye "Magenta," received its name.

Scarcely three months after the production of magenta was commenced in Lyons, it was transplanted to Mulhouse; then crossing the Channel, it became established in England, London, Coventry, Glasgow, and in Germany. New discoveries and inventions followed thickly one another, and the year following that of the invention of magenta was marked by the production of aniline blue. So rapidly did this new member of the group of the coal-tar colors gain the victory over the blue dyes before in use, that less than a year after its invention it took ten manufacturies in Germany, England, Italy, and Switzerland to satisfy the demand it had already created. The unprecedented rapidity with which the new dyes were adopted in the civilized nations of the West was, however, by no means the only remarkable incident in the history of their early successes.

Whilst the manufacture of aniline colors become European, their consumption spread still further; and the West supplied the East with coloring matters, sending its artificial dyes to China, to Japan, to America and the Indies—to those favored climes which up to the present time had supplied the manufactories of Europe with tinctorial products. This was a revolution. Chemestry dispossessed the sun of a monopoly which it had hitherto enjoyed. At the beginning of this century, when mythological language was in vogue, it would have been said that Minerva had triumphed over Apollo. But it was not sufficient to extract colors from tar and send them to China. In order to apply these colors, the process being altogether different from those followed by the Chinese, and their employment requiring the assistance of substances which were unknown to them, it was necessary to undertake the education of the Chinese dyers. This difficulty did not for a moment stop the manufeturer; he sent to China and Japan not only the workmen who should teach his customers the way to apply the colors with which he supplied them, but also the chemical products necessary for their manipulation, such as sulphuric acid and absolute alcohol, which were before unknown to them Thus arose considerable dealings with the East, the quantities sold by European manufactories in 1864, 1865, and 1866, amounting to several millions of francs.

At the period of the London Exhibition in 1862, but six years after the original invention by Mr. Perkin, chemists had already succeded in producing nearly all the principal colors from aniline. At that time only aniline black and green ware wanting, but the gap was soon filled up. The gamut of coloring matters derived from aniline is now complete; we have red, orange, yellow, green, blue, indigo, and violet. One singular result of recent research has been to make rosaniline or aniline red, the parent of all the other colors, so that in making a blue or violet, the manufacturer finds it to his advantage not to produce those colors directly, but first to obtain his magenta, and then to turn it into the shade, whether blue or violet, which he requires.

We are strongly tempted here to administer to our readers a small dose of formulæ, but must content ourselves with observing that aniline blue is nothing more than tryphenilic rosaniline; in other words, that the substitution of three equivalents of the radical of aniline (phenyl) for three of hydrogen turns magenta into blue; while the substitution of two equivalents, and, again of one equivalent, changes magenta into the blue and red shades of violet respectively.

The bare enumeration of the uses to which the new colors are put would exhaust our space. Not only are they applied to the dyeing of textile fabrics and calico-printing in vast quantities, but for numberless other branches of industry they have almost entirely supplanted the coloring agents formerly employed. Among the purposes, useful or ornamental, to which we find them put, are the tinting of paper, of inks for writing and typography, of paper hangings; they are employed in water-color painting, the coloring of designs and photographs, the lacquering of wood, the tinting of straw for bonets, and of pearl, bone and ivory: the imitation of pearls and precious stones, the decoration of glass and porcelain to imitate enamel, the soaking of the tissues of objects for microscopical and anatomical purposes, the tinting of candles and wax tapers, of white vinegar and syrup of raspberries, the blueing of linen, and the coloring of confectionery, etc. The art of perfumery also has recourse to the aniline dyes for the coloration of essences, soaps, cold cream, pomades, rice powder, etc. Their application to these different uses is self-evident, and granting the utility of the unguents with which the fair sex love to anoint themselves, we are constrained to admit that the introduction of aniline dyes to this branch of industry has been of undoubted service. They have superseded the metallic substances—the preparations of mercury, of bismuth, and of lead—which were almost all injurious to health. As, however, it is not our wish to destroy pleasant illusions, we shall not enter into more ample details on so mysterious a subject.

The New Gas Bill.

AN ACT TO REGULATE THE SALE AND POWER OF ILUMINATING GAS IN THE CITY OF NEW YORK.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. There shall be appointed for the better regulation of the sale and quality of the gas consumed in the city of New York, a board to be known as "the Board of Gas Examiners." Such board shall consist of three scientific chemists residing in the city of New York and Brooklyn, who shall be eminent for their special familiarity with the manufacture and tests of illuminating gas. Sach board shall be appointed by the Mayors of the cities of New York and Brooklyn, and their letters of appointment shall be evidence in all courts and places of the authority under this act of the persons so appointed. The persons so appointed shall hold their office for three years and until their successors shall be duly appointed.

SEC. 2. The said board shall have power to appoint a sufficient number of inspectors of gas to carry this act into effect, not exceeding five in number, which appointment shall be made from among those qualified by scientific and practical education to discharge the duties of said office; and such board shall also have authority to appoint a clerk, who shall keep a record of the proceedings of such board in such manner as the said board shall prescribe.

SEC. 3. Two members shall constitute a quorum of said board, and the acts of such quorum shall be sufficient for all the requirements of this act.

SEC. 4. The board of supervisors of said city shall immediately after the passage of this act, provide for the use of said board a central laboratory, which shall be furnished and equipped by said board of supervisors in such a manner as the board of gas examiners or a majority thereof shall require, in writing, which laboratory shall be located at some easily accessible point in said city to be designated by said board of gas examiners.

SEC. 5. The said board of supervisors shall, immediately after the passage of this act, further provide suitable testing places, equal in number to the number of public gas works in said city, which said testing places shall be located at such points as the said board of gas examiners may direct, but shall not be situated nearer than one thousand yards to the gas works whose gas is to be tested at such testing place. Such testing places shall be furnished and equipped by the said board of supervisors in such manner as the said board of gas examiners or a majority thereof shall require in writing.

SEC. 6. The said board of gas examiners shall, from time to time, prescribe the mode to be adopted and pursued for testing the purity of gas furnished by the gas companies in said city, and also the times of making such tests, and the manner of recording and certifying the same; and such rules as said board may adopt in reference thereto shall be obligatory upon said companies, and a compliance therewith shall be a condition precedent to the right of said companies to recover the price of gas consumed.

SEC. 7. The said board shall require tests of the illuminating power of the gas furnished by said companies to be made between the hours of five and ten P. M., at least three times each day from the 1st of October to the 1st of April in each day year, and between the hours of seven and eleven P. M. from the 1st of April to the 1st of October in each year.

SEC. 8. The said board shall prescribe the maximum amount of the various kinds of impurities with which the gas supplied by said companies shall be allowed to be charged, and the time when the rules prescribed shall take effect. Any company failing to conform to the rules prescribed by the said board in this regard, and furnishing gas of less purity than that designated by such rules, shall be liable to a penalty of one hundred dollars per day for each day when the gas furnished by it shall fall below the standard of purity prescribed by said board, such penalty to be collected as now provided by law for the collection and enforcement of penalties; all such penalties, when collected, shall be paid over to the Comptroller of said city.

S c. 9. It shall be the duty of the board to prescribe the quantity of gas to be consumed by each street lamp in said city per hour, and, in case of a deficiency of gas so to be consumed, it shall be the duty of the said board to certify the amount of such deficiency to the Comptroller, or other proper authority of said city who shall deduct from the amount claimed by any gas company as due for gas furnished to said city, the amount of such deficiency computed at the rate herein after prescribed as the rate to be charged to the private consumer of gas.

SEC. 10. Each gas inspector shall make a daily report to the said board of the result of the tests made by him on the preceding day: a copy of such report shall be furnished by said board to each gas company in said city on the day following the reception of such report by said board. The average of such tests shall be deemed to represent the illuminating power of the gas furnished by said companies on the day of such tests.

SEC. 11. It shall be the right of each of said gas companies to be represented at the time of taking such tests by their own representatives, but who shall not be authorized to interfere in any manner with the taking of such tests. Any company which may deem such test irregular shall have a right to appeal from the report thereof to the board of examiners, and the decision of such board on such appeal shall be final, and the proper correction consequent upon the sustaining of such appeal shall be made by the said board.

SEC. 12. The clerk of the said board shall make a monthly report thereto, in which he shall aggregate the daily reports of the inspectors, and shall therein state:

1. The daily illuminating power of the gas furnished by each company.

2. The rate of illuminating power for the month, embraced in such report, at which it shall be lawful for the companies to charge the price hereinafter mentioned.

3. The daily amount of the various kinds of impurities with which the gas furnished by the various companies is charged.

4. The maximum price to be charged by the several companies for the gas furnished by them during the month covered by such report. Copies of the said report shall be furnished to each company on request.

SEC. 13. The gas supplied by each company shall be under such a pressure as will balance a column of water at least one inch in height at the exit from the meter at the place at which the gas shall be supplied for consumption.

SEC. 14. The illuminating power of the gas to be furnished by each of the said companies shall not be less than what is known as the illuminating power of sixteen candles. The board shall prescribe the rules by which the illuminating power is to be determined; and the decision of said board with reference thereto shall be final.

SEC. 15. The said companies shall have a right to charge for each one thousand cubic feet of gas of the illuminating power aforesaid, a rate which, inclusive of the United States internal revenue tax, shall not exceed three dollars per such one thousand cubic feet, and such rate shall be diminished by the said board for each preceding month in the same proportion as

the gas so furnished shall fall below the standard of il uminating power herein described.

SEC. 16. In each bill rendered by any of said companies to the consumer there shall be stated the average illuminating power of the gas supplied for the preceding month, as determined by the said board or by the inspectors, and the price chargeable for the same in accordance with the provisions of this act and of the regulations of said board. And no debt for gas shall be recoverable unless a bill made out in compliance herewith, shall have been left at the place of consumption with some person of suitable age and discretion, having some relation to or authority under the actual occupant of said premises. In each bill rendered by any of said companies the last maximum price prescribed by the said board shall be the price at which the amount of gas specified as consumed in said bill shall be charged.

SEC. 17. Each of said companies shall afford to each member of the said board and to each of said inspectors and their assistants, all facilities necessary to enable them to comply with all the requirements of this act; and in case of a refusal to permit any member of said board or inspector or assistant to enter and inspect the works of said company, the said company so refusing shall be liable to the same penalty and to be collected in the same way as is hereinbefore provided in regard to penalties for the manufacture of impure gas, and to be collected in the same way.

SEC. 18. Each of said companies shall, on demand, supply to every applicant, other than those who may be indebted for gas previously furnished, such amount of gas as such applicant may require

SEC. 19. If any occupant of premises which may have been supplied with gas shall remove therefrom without having paid the said company for the amount of gas previously supplied to him it shall not be lawful for any one of such companies to refuse to supply gas on that account to the subsequent occupant of such premises.

SEC. 20. In case of a dispute arising between any consumer of gas and any of the gas companies in said city as to the amount or quality of gas consumed or furnished, such dispute shall, upon the request of either party, be referred to the said board for decision, and its decision thereon shall be final; and, in case of such dispute by a consumer of gas, and a reference on his application to said board, it shall not be lawful, if the said consumer shall deposit with the said board the amount claimed as due, for any of the said companies to cut off the supply of gas to such consumer. On the decision of such reference the said board shall pay to the said company from such deposit the amount adjudged to be due to it.

SEC. 21. Each member of said board of examiners shall be paid by the said board of supervisors a yearly salary of $5,000; and each of said inspectors shall be paid a yearly salary of $1,500, and the clerk of the said board shall be paid a salary of $2,000 a year.

SEC. 22. Immediately after the passage of this act and the appointment of the said board of examiners, the said board shall signify, in writing, to the board of supervisors the number of inspectors deemed requisite by them to carry out the provisions of this act, and also the amount necessary to completely equip the central laboratory and the testing stations hereinbefore provided for; and upon the receipt of such written statement it shall be lawful for and it shall be the duty of said board of supervisors to cause to be assessed upon the real and personal property of each gas company in said city, and in such a manner as to equalize the same, its proportion of the amount necessary for the salaries hereinbefore prescribed, and the amounts specified as necessary by said board to comply with the provisions of this act and to collect the same immediately by the same process by which other taxes upon real and personal property in said city are now authorized to be collected.

SEC. 23. And hereafter it shall be the duty of the said board of examiners, prior to the first day of September in each and every year, to furnish the said board of supervisors with a statement, in writing, of the amount necessary to be furnished by said board of supervisors for salaries and expenses under this act, for the succeeding year; and it shall be the duty of the said board of supervisors to collect annually the amount so stated by assessment and levy, if necessary, upon the real and personal property of the gas companies in said city at the same time with the collection of the annual taxes in said city.

SEC. 24. Any person appointed under this act, who shall thereafter receive any compensation from any of the gas companies in said city, for the performance of any official act or of any professional duty which may be connected with this act, shall be deemed guilty of a misdemeanor, and shall be punished accordingly.

SEC. 25. All acts and parts of acts inconsistent with this act are hereby repealed.

SEC. 26. This act shall take effect immeditely.

[Since the above was in type, we learn this bill has not yet become a law and it will not therefore, this term.—EDS.]

Williamsport (Pa.) City Gas Works.

Through the politness of T. Coryell, the superintendent, and Ed. McGuinly, the accommodating engineer, we were accompanied through the works, as extended, which was commenced in May last, and finished in the early part of December, and consists of a new tank of 62 by 20 feet. The new addition of the building, brick, is 75 feet by 24, and the ceiling being 17 feet above the floor. The tank and building containing about four hundred thousand brick: in the former thirteen hundred barrels of the Rosendale cement was used.

The station meter is 5 by 5½ feet, which occupies the east room, and west of it is a room filled with the new washers, scrubbers and condensers. The washers and scrubbers are 8 feet 11 inches in length, and 2 feet 7 inches square. The condensers in number are 32, each one being 12 feet 8 inches. The purifying room, north of the condenser and meter room is 26 feet 10 inches by 24 feet, which contains four purifying boxes 6 by 8 feet with six layers of seives for lime and 8 inch connections with a dry centre seal, which is below the floor and extends into the cellar.

The lime room is 17 by 11 feet 9 inches. The refuse lime is deposited in the cellar north-west of the purifying room, which holds hundreds of bushels.

The new tar well is within twelve feet north of the new building, which holds hundreds of barrels.

The Company has adopted the clay retorts of 9 feet in length, and is using those recently manufactured by B. Kriecher, of New York, and John Newkumet, of Philadelphia.

The whole were heated from a tube boiler 8 feet by 20 inches, manufactured by Morris, Tasker & Co., of Philadelphia, and the exhaust steam is conveyed to the tank upwards of a hundred feet, which prevents the water from freezing during the coldest weather.

The capacity of the works, without an additional holder, is sufficient to dispose of 75,000 cubic feet every 24 hours.

The extension of the street main during the past year exceeds ten thousand feet, and one hundred and twenty additional meters were set for new consumers. The meters were manufactured by the American Metre Company, and Harris & Bro., of Philadelphia; the station metre being made by the latter firm, which would register upwards of one hundred thousand cubic feet in 24 hours.

There are six 8 inch valves attached to the condenser and station meter. There are six wrought iron columns with wrought iron girders, and girders to keep the gas holder in place.

The gas holder is a perfect article, and was made by the celebreted builders, P. P. Deitz & Fowler of Philadelphia, under the direction of Morris, Tasker & Co., and is built of the best American iron, who manufactured the whole apparatus at the Pascal Iron Works under the direction of Peter Munzinger and Mr. Brigga.

Robert Prettiman, an employee of Morris, Tusker & Co., superintended the construction of the tank, who faithfully directed the bricklayers, as well as those who prepared the cement; he displayed efficiency and skill in the execution of the same. James Hardick and George Wade fitted the whole works in connection with the retorts, hydraulic main and the gas holder, which had been previously prepared in Philadelphia, and not a leak was discovered, after putting the works in order to manufacture gas.

The brick work was done by Sowers & Rubridge of our city; and the carpenter work was executed under the direction of Henry Baird, a gentleman of taste and skill as an architect.

The whole work appears to have been a complete success. The gas light cannot be excelled, and the consumers need not be fearful hereafter of being without light when required.

After the completion of a new coal house, and the premises be enclosed with a fence, together with the requisite siding from the railroad to the coal house, but few works in Pennsylvania will excel them. The pressure on the works from the gas holder is less than 2½ inches.

We recommend our citizens to visit the works, who may then form an idea of the great expense in their erection. The cellar under the purifying house is apparently as clean as a common kitchen, and is even white-washed.—*Williamsport Gazette.*

A new Apparatus for testing the point of ignition in petroleum and parafine oils has been invented and manufactured by Mr. A. Casartelli, of Liverpool. The instrument is very simple in construction, readily understood, and for accuracy and sensitiveness its performance is said to be everything that can be desired. It has been highly approved of by Government, and as the new Amendment Act regulating the sale of such oils, came into force on the first instant, compelling the application of tests, it promises to become generally adopted throughout the oil trade.—*London Builder.*

Illuminating Gas.

An economic combustible and lighting gas has been proposed by Mr. L. S. Thomassin, chemist of rue d'Enghieu, Paris. It is produced by simultaneously casting on incalescent coke, contained in a retort heated to a red heat—first, a mixture of water, with about three per cent. of glycerine; and secondly, a jet of oleaginous matter, or carburetted hydrogen, the proportion of which would vary according to the degree of richness or lighting power desired. In coming in contact with the heated coke and iron, the water saturated with glycerine resolves into hydrogen gas, bicarburet of hydrogen, magnetic iron, and a little carbonic acid; the fatty matter furnishing the bicarburet of hydrogen also decomposes. The gas formed escapes at the back or hind end of the retorts by means of tubes which connect them with a collecting pipe, which conducts them to a bath or cistern. The decomposed water and fatty matter are collected in a reservoir provided with a waste-pipe, the gas reaching the bath or cistern of water made in sheet-iron of any desired form hermetrically closed, and is filled up to a certain height, and in which the end of the collecting-pipe plunges; the carburetted gas cools, and then passes through an elbow-pipe to a serpentine-pipe arranged in the interior of the washing cistern, where it gets rid of the condensed water and fatty matter held in suspension, which passes along with the gas into the serpentine pipe, and accumulate in a recipient ot the bottom of the pipe, from whence they are discharged into a reservoir by means of a pipe; the gas then ascends by another pipe into an iron cylindrical refiner, filled with pieces of coke, sawdust, wood, and an alkali of some sort. This refiner is divided by a partition, which makes or forces the gas to pass twice through the height of the material it contains before it escapes by a pipe at the top, from whence it passes to another and final refiner of the same form and material as the last named, the interior of which is furnished with floors or stages pierced with holes, and between which floors moss, cotton, or any light or spongy substance slightly steeped in benzoin, petroleum, or schist; from thence the gas passes through a pipe into a gasometer of any description or dimensions, to be finally distributed therefrom.—*London Mining Journal, March* 1869.

Purifying Coal Gas, Etc.

Mr. Alexander Rollason, in his improved process of purifying coal gas and obtaining ammonia from coal gas products, takes peat bog, or other decomposed vegetable matter, and having disintegrated it, mixes with it strong sulphuric acid, in about the proportion of one part of the latter to three parts of the former, after which it is subjected to a slow heat until it has become charged by the sulphuric acid, or after the peat bog, or any decomposed vegetable matter, has been disintegrated, it is subjected to a heat sufficient to dry but not carbonise it, and the acid is then added. Secondly, he takes clay, mud, or similar siliceous matter, and after burning them so as to expel the carbonic acid they contain, and having disintegrated or burnt matter, mixes with it sulphuric acid, in the same way and proportion as with the peat bog, or any decomposed vegetable matter. Either of the foregoing first and second products are put into ordinary coal gas purifiers, and the gas passing through them is deprived of its ammonia, which these products fix, forming sulphate of ammonia. Or they may be mixed with ordinary coal gas water containing ammonia, which water would be subsequently evaporated until the material was saturated with sulphate of ammonia, or hydrochloric or nitric acid may be used instead of sulphuric acid in obtaining the first or second products, so far as relates to its being used for coal gas water, in which case muriate, or nitrate, or sulphate of ammonia would be produced.—*London Min. Jour. March.*

A Mountain of Coal.—There was piled by the Delaware and Hudsan Canal Company, in this borough, during the last winter, and up to Saturday night (March 27), 450,000 tons of coal. For the same time, last season, there was piled 380,000 tons—a gain in favor of this year of 70,000 tons. In addition to this, 65,000 tons have been sent from here over the Honesdale Branch and Erie Railway. Allowing five tons as the average for a Delaware and Hudson coal car, it would take 90,000 cars to transport the coal now piled here; and allowing fifteen feet to a car it would make a train 135,000 feet long or a trifle over twenty-five and a half miles, or about the distance from the upper part of Honesdale to Lackawanna.—*Honesdale Citizen.*

BÉTONS AGGLOMÉRÉS, OR ARTIFICIAL STONE.

[*Written for this Journal.*]

NUMBER II.

In our issue of April 16th we spoke of the artificial stone known in Europe under the name of Bétons Agglomérés. Since that time we have met a gentleman, recently arrived from France, where he has examined with great interest the works now in course of erection in the Forest of Fontainbleu, and has brought over photographs of several of the agglomerated cancrete, monolithic structures.

We notice an arch of solid artificial stone, 200 feet of span and only 20 feet elevation, having at the centre a section of only three by four feet. This extraordinary piece of agglomerated concrete, composed of five measure of sand, one of hydraulic lime, and one of heavy hydraulic cement, was erected at St. Denis, close to the railroad station of the "Chemin du Nord," and stands there the wonder of travellers, and the admiration of men of art, a gigantic beam resting only on its two extremities on bearings *two hundred feet apart.*

The next photograph is that of part of the line of arches which, when completed, will form the one hundred spans of the acqueduct of Le Grand Maitre, in one of the valleys of the Forest of Fontainbleu, and part of the bétous agglomérés pipe, which is to be thirty-eight miles in length. The arches are forty feet span, very light and graceful, and are made all of one piece, with the pipe which they support some fifty feet over the level of the ground. The sand employed in this wonderful structure is sharp and clean, but of a finer grain than could be desired, yet the work progresses with miraculous rapidity, and has the appearance of strength as well as elegance; the piers, the arches, pipe and braces, being all af one piece—a perfect monolith.

Next we see the photograph of a beautiful church, also built entirely of one piece; but for the sake of satisfying the eye and carrying out the design, imitations of joints have been made, so that the appearance is that of a handsome cut stone gothic church.

Bridges over canals, basins, abutment walls, etc., all remarkable for the boldness of their conception as well as the beauty of their execution.

The inspection of all these works, perfect monoliths, actually made of sand and lime (more or less hydraulic as the case may be), and exhibiting such degree of strength, is well calculated to awaken an inquiry into the process by which such results are obtained; especially when we find that the béton agglomérés is not only used as a substitute for brick, rough stone masonry, and even cut stone masonry, but now it is extensively used for some specialties of hydraulic works, where its monolithic character is of such value as to make it stand without a rival for building such structures.

The inquiry then is—what is the reason that with the same materials, employed by every engineer, the company of Paris is able to obtain results which are acknowledged by those very engineers as being far superior to anything ever attempted before in that line?

We cannot do better in answering this question than to quote the words of Mr. Coignet, which explains his views of the phenomenas of the setting of mortars. The following we translate:

"In order to make an artificial stone with a great quantity of sand and a small quantity of lime, with, in some cases, the addition of a minimum quantity of heavy hydraulic cement, I have found that it is necessary to do away with the greater part of the water generally employed in the confection of mortars; this water in excess interposes itself between the molecules of lime, and prevents its crystalization, *or its setting.*

"But as it is necessary that the mixture of sand and lime present somewhat the character of a short paste, I submit the material to an energetic trituration, in a mill acting by compression and friction, until without the addition of any more water, it will present itself under the appearance of a pulverulent paste or pasty powder: a peculiar and very characteristic state of the mixture, well known to one accustomed to work by my method.

"This pulverulent paste (or *artificial stone paste*) is the material, the means, the ingredient. But, in order to become A STONE IT HAS TO BE AGGLOMERATED IN A MOULD.

"The mould is made so that its interior dimension and shape correspond to the size and shape of the desired stone, and the *artificial stone paste* is agglomerated in it in the following manner.

"A certain quantity of the artificial stone paste is first put in the mould, spread out in a thin layer, and with the aid of a heavy pounder, this stratum is agglomerated; that is, it is pounded systematically until it is reduced by one-third of its original thickness. Upon this a second quantity of pulverulent paste is spread and agglomerated as the first, and so on alternately, spreading the artificial stone paste and applying the action of the powder until the mould is full. This is what I call the process of agglomerating, which I regard as of the most importance to the production of a good stone.

"The effect of this mode of operating may readily be understood, when we consider that by this systematic pounding, or packing, each and every separate grain of sand, as it were, has been acted upon, driven down, packed, lodged in and among its neighbor's grain of sand, until the whole mass has acquired a great density.

"It is to this greater density that is due the strength which my artificial stone acquires in so short a time, as to allow of buildings of great height being erected, without any interruption in the work. But my process presents another cause for the subsequent hardening of the stone, which is found in the absorption of carbonic acid from the atmosphere.

"It is well known that if we expose a block made of lime and sand to the action of rain and atmosphere, the lime will absorb carbonic acid therefrom, and will gradually be transformed into carbonate of lime.

"Now, as lime will absorb nearly its own weight of carbonic acid in this process of transformation, it follows that in a stone like the one made by my method (weighing some 2300 kilog. to the cubic meter), and already so close in its grain, this absorption cannot take place without creating an alteration in the molecules of the lime, and transform it into a marble-like, or crystalized, carbonate of lime. This is indeed the fact, as can be seen when the stone is examined under the microscope; and it is for that reason that a block of agglomerated concrete, which just after being made will only resist 200 to 300 kilog. to the square centimetre will, in course of time, sustain the enormous weight of 400 to 500 kilog. to every centimeter square, without being crushed."

Without scrutinizing the theory which Mr. Coiquet advances, we are compelled to admit the bare facts—the results obtained—the figures regarding the extraordinary strength of the bétons agglomérés; for these figures come to us attested by unquestionable evidences; and besides, we understand that the city of Paris has adopted the system for the construction of their sewers, their curbstones, public stairways, etc., and that it has been adopted for basements, foundations, and even for the whole erection of such buildings as saw-mills, where great resistance to vibration is required.

We hope soon to give our readers some practical details regarding the erection of the great acqueduct of Fontainbleu, as we are to receive by next steamer, from the engineers in charge, the plans and section of this interesting and renound structure. Meanwhile, any of our readers desiring further information on the subject, will get them by addressing H. G. HUBERT, 169 Broadway, New York.

The New York Society of Practical Engineering.

[*Reported Expressly for this Journal.*]

The regular fortnightly meeting of this society took place on Tuesday evening, April 27th, at Room 24 Cooper Institute. President James A. Whitney, in the chair; W. B. Harrison, Recording Secretary.

Before the regular subject of the evening was taken up, a new and improved Dredging Machine was exhibited by Professor Johnson, of Saco, Me. This apparatus, though more especially designed for dredging rivers, docks, etc., is equally adapted to the raising of auriferous, or gold-impregnated sand from the beds of rivers: and it consists of a barge-shaped vessel constructed with air chambers, by means of which it is enabled to float while filled with mud and water, A valve is suitably arranged in the bottom of the boat, which when opened causes the sinking of the boat to the water-line. The apparatus is provided with a suction tube, provided at the bottom with a funnel extending from the mud chamber to the bottom of the stream upon which the boat is being floated, and operated by a powerful steam pump, whereby the sand or mud is drawn with the water into the boat.

After a short discussion relative to the merits of this invention, the regular subject for the evening, which was "Steam Boilers," was taken up.

A regularly prepared paper on said subject was expected, but from causes not satisfactorily explained, no paper was presented and none read. The meeting was, nevertheless, ably and interestingly conducted, the subject being discussed by various members of the society, who gave their views and experiences on the subject.

A model of Mr. B. T. Babbitt's improved sectional steam boiler, of recent invention, was exhibited and explained by one of the members. This new steam generator has a horizontal base-tube, from which extends upwardly series of vertical main tubes, each having a sub-series of short horizontal tubes radiating from them and closed at their outer ends. Above this is arranged a steam drum, into which the steam when generated passes by means of curved conduits. The advantages claimed for this boiler are, not only safety from disastrous explosion, but also perfect freedom of expansion and contraction, and an increase of heating surface.

Mr. J. K. Fisher spoke in commendable terms concerning the safety of this boiler, but thought its heating surface might be increased by giving the tubes a zig-zag shape, which form, however, while effecting the purpose proposed, would increase the difficulty of cleaning and also add to the cost of manufacture.

Dr. A. W. Hall in reply regarded safety as the most indispensible requisite in steam boilers, and thought that said feature should engross almost the entire attention both of the inventor and builder of steam generators, regardless of cost. He afterwards described a plan of his own for introducing heated air into steam, by first passing the air through hollow grate bars in the furnace.

Professor Johnson described a new contrivonce consisting of a paddle wheel araanged in a cylinder containing water. By sufficient application of heat to one side of the cylinder a current is established therein, which causes retation of the wheel. In this connection it was stated that a somewhat similar device had been lately invented by a distinguished inventor and boiler manufacturer of this city, which device if successful, bid fair ultimately to dispense with the necessity of using boilers at all.

Mr. J. K. Fisher was earnest in his denunciations upon the way many unsafe boilers are now being used on steamboats in this and other countries, and thought that if laws were enacted which would compel the owners of steam vessels to pay for all loss of life arising from boiler explosions on their vessels, it would, by making it to their interest to use safer ones, greatly reduce the loss of life from this cause.

Mr. J. V. C. Smith concurred with Mr. Fisher in his views on this subject, and spoke of having witnessed an instance of a boiler leaking for several days, while on board of a steamer which was crossing the Gulf of Mexico, said boiler being doubtless liable to explosion upon the slightest increase of pressure.

A steam generator, known as the Miller Boiler was next described by Mr. L. Holmes. This boiler was invented about twenty years ago, being about the first of that class known as sectional boilers. The Harrison Boiler, a generator of more recent invention, was also mentioned in this connection. This boiler, in addition to its perfect safety in a comparative point of view, is also susceptible of having its capacity indefinitely increased or diminished by the addition or subtraction of its parts.

In conclusion, Mr. Holmes spoke of the primitive mode of propelling steam boats by means of steam generated in wooden boilers: and the wooden boiler of the old steamer "Clermont" was here described.

The discussion having been continued to a late hour, the meeting adjourned.

The Paris Gas Company presents a striking instance of the result of careful and skilful management. At the annual meeting of shareholders, on the 25th March, a dividend of 24 per cent. was declared for the year 1868. The gross receipts were reported to have amounted so $9,218,859, and the expenses to $4,969,690: the net profit for the year were consequently $4,259,160, which sum was sufficient to pay the dividend of 24 per cent., and leave a surplus of $85,565 to be carried forward to the next account. The present value of a $100 share in the company is about $320.

Dissocation.—Henery Deville says that when hydrogen burns in ordinary oxygen there is never more than half combustion, even in the hottest part of the flame, owing to the "dissociative" tension of the watery vapor, which resists it. We diminish this, and increase the combustion, by increasing the pressure.

Removal of the London (Eng.) Gas Works Out of the City.

Want of space prevented our publishing the following article taken from the London *Mining Journal* in relation to the proposition made to supply London with gas manufactured at Newcastle. The proposition is one which has been, from time to time brought forward almost from the first introduction of gas lighting at the beginning of the century; but as it invariably emanated from those who have no practical acquaintance with the subject, and will not trouble themselves to ascertain the experience of others, their suggestions might be allowed to pass unnoticed:

"It is stated that that the Metropolitan Board of Works has again had the question of the removal of gas manufactories 'from the populous districts of the metropolis' brought under its consideration; and, in connexion with that circumstance, some would-be *savant* laments that the proposition for a remedy 'to the present dangerous and preposterous system of making gas in the most crowded parts of the richest city in the world" should be limited to removing the factories 'into the country,' and conveying the product by a few miles of piping to the consumer. This authority writes that he cannot understand why our gas should not be made at the mouths of the coal pits that supply the material, which, by a costly and tedious process, is at present brought to London by rail or sea, the freight being not less, probably, thon 10s. per ton between the pits and the factories, all of which the consumer pays, besides being injured in health and endangered in person by means of the manufacture taking place in that which is the worst possible spot in the world for the purpose. The cost of laying down gas-mains between London and (say) Newcastle would not be greater than the maintenance for a short period of the fleet of colliers which bears the crude material to London, where wages, living, and land are more costly than anywhere else.

"The whole of the arguments adduced are entirely fallacious, and display the utmost disregard for every essential fact. The make of gas in the metropolis at present far exceeds eight million thousands of cubic feet per annum, which in round numbers requires the consumption of 1,000,000 tons of coal, and involves an outlay by the gas manufacturers, for raw material, wear and tear of plant, and labor, of about £1,000,000. But of the eight million thousands manufactured not more than six million thousands reach the consumer, one-fourth of all the gas made being lost by condensation, leakage, etc, so that the companies (taking the average at 4s. per thousand) only receive £1,200,000 for their annual make. Now if the loss in delivering even from the works to the consumers in the same district is equal to 25 per cent, it can readily be imagined that the attempt to convey gas to London from even the nearest coal field would be attended with so serious a loss that we might be deprived of the advantages of our gas supply altogether, unless we consented to a considerable advance in the price of gas But the actual loss of gas is not the sole objection to its manufacture at a distance from the place of consumption; the mere cost of overcoming the friction resulting from the passage of the gas through the pipes, so as to maintain the requisite pressure at the burners, would vastly exceed the cost of conveying the coal the same distance: the cost of keeping the extra pipes in repair would exceed the total cost of making the gas, even in London; and a comparatiuely trifling injury to the provincial main might leave the city in darkness for an inconvenient period."

Nitro-Glycerine Made Harmless.—Although the immense power of nitro-glycerine as a blasting material has never been questioned, the danger attending its use has entirely prevented its introduction, except in a very diluted form—that is, to saturate woody or other granular substances. In dynamite, however, the great objection is that the power is reduced exactly in proportion to the increased safety secured. To remedy both evils simultaneously, Mr. Horsley, the well known scientific chemist of Cheltenham, has invented an improved protective matter, which he designates safety nitro-glycerine powder. Mr. Horsley states that the preparation is designed for the safe conveyance of nitro-glycerine or blasting-oil to any part of the world, the great advantage being that it admits of the oil being easily recovered, at any time, and rendered available for the miner's use, even over the hole itself, if necessary, by following certain instructions to be sent with each package. With regard to the safety of the protected nitro-glycerine, the inventor is prepared to submit it to severe tests, and claims that it will not ignite or explode on the application of fire or heat; that it cannot be exploded by a blow on an anvil; and that it cannot be exploded by a percussion-cap fired in a charge of it.—*London Exchange.*

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.]

RICHMOND, May 13th, 1869.

Messrs. Editors: Your very valuable paper has been a regular and welcome visitor at these Works for the past year, and as I am not aware of its having been paid for I herewith enclose one year's subscription, and hope you will continue to send it, as I scarcely know how I could do without it.

I take the liberty of sending by this mail the annual report of these Works, ending 31st January last, which I hope you will examine and make such remarks upon it, as may seem to you best.

Yours respectfully,
B. BRAGG, Sup't Gas Works.

[As an evidence of the appreciation which our Journal is held, we take the liberty of publishing the above. We also return our thanks to the writer for the annual report forwarded to us.—Eds.]

Utilization of Coal Dust.

The following memorial in relation to utilizing coal dust for cheap fuel has been placed before the Members of the Senate and Assembly of New York, at Albany, by James H. North, M. D., of Rochester, N. Y. If its claims are sound, and we see no reason why they are not, then Mr. Stone, the inventor, has developed a new economy especially valuable for the use of light draft boats to navigate shallow waters and the Erie and other canals,

A PLAN FOR THE UTILIZATION

OF COAL DUST FOR CHEAP FUEL, WITH SPECIAL REFERENCE TO THE NAVIGATION OF THE ERIE CANAL BY STEAM.

Many experiments have been tried to make useful for fuel the large quantities of coal dust which accumulate at the mines, and in the coal-yards. None has thus far been found successful. At the Compressed Air Bath Institute, corner of Court and Stone streets, Rochester, New York, an engine of twenty-five horse power is in daily use to compress air. This engine has been run for eighteen months past, eight hours a day, at a cost of $1.50 a day. The coal dust which we are now using costs $1.66 per ton, while coal costs $8.00 per ton—a clear saving of $6.34 per ton. This saving has been accomplished, after many experiments with all kinds of cheap fuel by Mr. Draper Stone, Engineer, who built this engine expressely for the purpose for which it is now in use. In order to use this fuel to advantage, certain conditions are necessary, viz: a large boiler surface, and a strong draft. As a general rule, the boiler must be constructed for the fuel, to get the full benefit of the cheapness of coal dust. The practical operation of this fuel for steam boilers, which has been tested every day for eighteen months, can be seen any day at the corner of Court and Stone streets, Rochester, New York, and explanations will be made. No effort has been made to introduce this discovery to the notice of the public, because Mr. Stone has been at work to develop its most important use, in his judgment, viz: its application to the navigation of the Erie Canal by steam. Mr. Stone has been a practical builder of engines for light draught steamers on shallow Western rivers. The plans for this engines are now ready; the cause of the numerous failures which have been made in times past, are thoroughly understood, and will be avoided. The engines will occupy but a small space in the canal boat—say 12 feet by 16 feet—not to exceed eight horse power; the propellor will make but a small wash; the power always sufficient to take in tow one boat: the fuel cheap. This is the real foundation of the whole plan and easily obtainable. The boiler and machinery would be constructed for the fuel, and would cost about $1,600. Speed about two-and-a half miles an hour. In the present construction of boats no higher speed than fifty to sixty miles a day can be attained. The machinery is compact and simple; not liable to get out of order, and can therefore be run by a cheap engineer The expense of towing is now thirty-two cents a mile. This can be reduced to sixteen cents, and all dalays in changing horses and crossing two lines will be avoided, and the miseries of horse flesh abolished. Considering the competition which the Erie Canal is to meet with from direct trade by the Mississippi River and the railroads, this is a matter of importance to the State of New York.

Recent American Patents.

Pertaining to Gas, Water. Etc.

89,268.—ROTARY PUMP.—Moses L. Andrew, assignor to himself and George Burrows, Cincinnati, Ohio.

89,271.—VAPOR BURNER.—Silas D. Baldwin, assignor to himself and Daniel Leonard, Chicago, Ill.

89,289.—STEAM ENGINE CUT OFF.—Charles Carr, Boston, Mass. Ante-dated April 17, 1869.

89,291.—STEAM GENERATOR.—James C. Cochrane, Rochester, N. Y.

89,338.—PUMP.—John R. Pomroy and L. J. Walter, Lockport, N. Y.

89,344.—PUMP VALVE.—Alexander K. Rider, Elizabeth City, N. J.

89,362.—TURBINE WATER-WHEEL.—Alonzo Warren, Suffolk County, Mass.

89,367.—LAMP-CHIMNEY.—Chas H. Wolcott, Randolph, N. Y. Ante-dated April 16, 1869.

89,378.—PUMP.—Salmon Belden, Visalia, Cal., assignor to himself and Edw. F. Roberts, South Amboy, N. J.

89,398.—STEAM PUMP.—Walter W. Gilbert, New York City.

89,399.—GOVERNOR VALVE.—Walter W. Gilbert, New York City.

80,413.—WATER-ELEVATOR.—L. M. Knowles, Owatonna Minn.

89,471.—STEAM ENGINE VALVE.—Chas. Dawson, Lanesborough, Pa.

89,534.—STEAM-PUMP.—Joseph C. Wightman, Newton, assignor to Chas. Houghton, trustee, Roxbury, Mass.

89,581.—GOVERNOR FOR STEAM ENGINES.—Reuben K. Hentoon, assignor to himself and J. Augustus Lynch, Boston, Mass.

89,588.—APPARATUS FOR MAKING ILLUMINATING GAS FROM GASOLINE.—Hiram S. Maxim and James Radley, New York City.

89,592.—STADDLE-PIPE FOR HYDRAULIC GAS-MAINS.—Peter Munzinger, Philadelphia, Pa.

89,595.—STEAM-GENERATOR.—William Samuel Page and Richard East, Nine Elms Wharf, Nine Elms, Eng.

89,665.—APPARATUS FOR CARBURETING AIR OR GAS.—Josiah Jnnson, Toledo, Ohio.

89,714.—LOW-WATER INDICATOR.—William W. Virdin, Baltimore, Md.

89,781.—STOP VALVE.—Benjamin Green Martin, New York City.

89,786.—STEAM GENERATOR.—J. H. Mills, Boston, Mass.

89,802.—PRODUCING GAS FOR HEATING AND LIGHTING.—T. G. Springer, Clinton, Iowa.

89,809.—LOCOMOTIVE STEAM ENGINE.—John S. Stuart, Philadelphia, Pa.

A Diamond Test.

The more valuable an article is the more it is conterfeited, and the greater the perfection to which faliscation is carried. The diamond has been so successfully imitated that he must be an expert indeed who can tell the false from the true. It by no means follows that because a man deals in jewelry his honesty must be of the first water, and the fact of a purchaser having paid for a diamond is not always proof that he has obtained one. There are known tests of genuineness, it is true; but they are chiefly optical, and require apparatus and skill to make them. A method which any one can apply, or easily get applied, has been a desideratum; but the want exists no longer. If you have a doubtful stone, put it, or cause it to be put, into a leaden or platinm cup, with some powdered flour spar; and a little oil of vitriol; warm the vessel over some lighted charcoal, in a fire-place; or wherever there is a strong draught, to carry away the noxious vapors that will be copiously evolved. When these vapors have ceased rising let the whole cool, and then stir the mixture with a glass rod to fish out the diamond. If you find it intract it is a genuine stone; but if it is false it will be corroded by the hydrofluric acid that has been generated around it. A small "paste" diamond would disappear altogether under the treatment. They who profit by this recipe have to thank Signor Massimo Levi, an Italian chemist.

A French Engineer has invented a "durometer" for testing hardness of metals by drilling. The drill is moved at an uniform speed, and the number of revolutions made by the driving shaft, which is indicated by a signal gong, shows the hardness of the metal. It is said that nearly all the rails recently manufactured in France are tested by means of this invention.

Prices of Gas Coals—May 17.

PROVINCIAL.

Duty, $1 25	Coarse. Gold.	Slack. Gold.
Block House	$1 75	$1 00
Gowrie	1 60	0 90
Lingan	1 75	0 75
Sydney	2 13½	0 71½
Pictou (Albion)	2 25	1 25
Pictou (Acadia)	2 00	1 00
Little Glace Bay	1 60	0 90
Caledonia	1 60	0 75
International Co.'s Union Mines	1 60	0 75

Free on board vessels at the mines—uayable in gold.

AMERICAN.

	Coarse. Currency.	Slack.
Westmoreland Co.	$8 90	$8 00
Despard Coal Co.	8 50	8 00
Penn	8 90	8 00
Newburgh Orrel Gas.	8 50	8 00
We-t Fairmount Gas Coal		7 00
Powelton Gas Coal	8 00	7 00

Delivered in New York.

PRICES OF FOREIGN COALS—DUTY $1.25 PER TON.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool House Orrel, scr'd	$16@$18
" " Cannel, scr'd	18@$22

Per ton, 2000 lbs. delivered.

Ruling Prices of English and American Gas Coals between 1866 and 1369.

English Caking Coal	$9 to $12
English Cannel	10 to 17
Ex ship.	
Despard (American) Coal	$8 to 9½
Westmoreland	8 to 9½
Pennsylvania	8 to 9½
Block House (Cape Breton)	8 to 10
Albert Cannel (New Brunswick)	35

The price of Pictou and Sydney coarse coal is $2.25, with 5 per cent. off to purchasers of 2500 tons. On Pictou coarse coal 10 per cent. off to purchasers of 5000 tons and upward. This discount is intended for the importer's commission, and the price should therefore be quoted $2.35 on both Pictou and Sydney. The price of Sydney fine coal is 75 cents instead of 71½, without discount. The price of Pictou fine is $1 25. 5 per cent off to large purchasers only, and the quotation should therefore be $1.25.

The Sacramento (Cal.) Gas Co. has increased its capital stock from $500,000 to $1,000,000, in shares of $100 each. A dividend of ½ per cent. has been declared. The price of gas in Sacramento is $9 per thousand feet.

The St. Louis Artesian Well is now down something over 3,000 feet, and still going down at the rate of about three feet a day. This rate of descent has been kept up for over two years. We are not informed as to the depth at which they expect to find water. This well is being sunk at the expense of the country.

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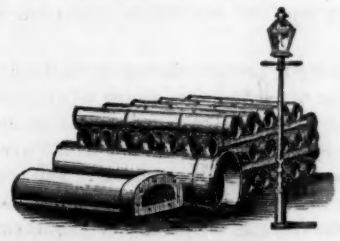

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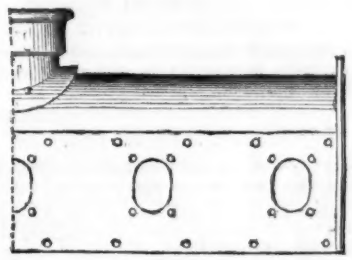

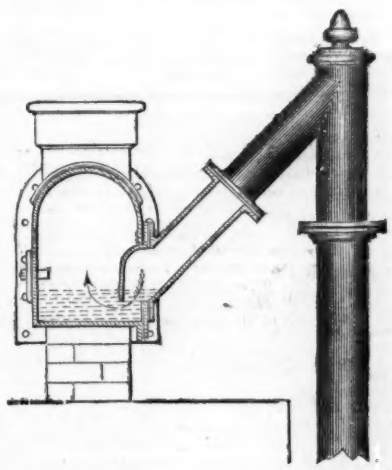

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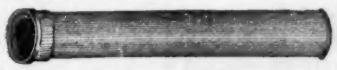

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EDITORS AND PROPRIETORS.

Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

MONDAY, MAY 17, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

New Electric Lamp.—The London *Mechanics' Magazine* describes a new lamp, exhibited by Mr. John Browning, F.R.A.S., at a recent meeting of the British Association,—which is to be worked by a Grove's battery of only six cells, and is intended for the use of photographers in printing transparencies. In it, the carbon points instead of being pulled a short distance apart, are allowed to touch each other, and are fastened in that position, so that the current has to burn a space between them for itself. A mechanical arrangement causes the contract to be renewed as soon as the wasting away of the points breaks the communication. The electric light is destined to supersede both gas light and the lime light for photographic purposes.

New Light.—Mr. J. Hogg, of Edinburgh, passes a mixture of coal gas and air through a tissue of iridio-platinum wires at a given pressure. The metal is heated to a white heat, the flame disappears, and an intense white light results, which may be used for photographic purposes as well as the magnesium light. Neither a gale of wind or a fall of rain, will extinguish it.

IS GAS-LIGHTING DANGEROUS?

Some subjects—topics of common conversation—it is the wisest and safest course to let alone. They soon wear themselves out and are forgotten. Others which, in various ways, are kept before the public may not in reality be of much importance, and yet ought not to be permitted to pass unnoticed. It seems as if some of these prejudices would never die out. From time to time they are revived, repeated, and republished with all the gravity and oraculousness of new discoveries. After making large allowances for defective information, for official bias, and for, probably, something akin to disinclination to examine all side of a question, we cannot but think it unfair for any one to talk and write about gas-lighting being dangerous.

Of all classes of statistics those professing to explain the causes of the fires which annually occur in the metropolis are the least satisfactory. No doubt great care is exercised in collecting information, and all that can be done is done in trying to get at the truth. Let it be remembered, however, that for years past it has been the practice to ascribe to "gas" the principal part of the unexplained fires, and so it had to bear a vast deal more than justly belonged to it. Whatever may be the proportion of fires actually chargeable to the use of gas, those which are accidental, or, in a certain sense, unavoidable, ought to be distinguished from those occasioned by willful carelessness, and culpable negligence. In the latter cases the persons who have misused or misapplied the gas have been "dangerous," not the gas itself.

All kinds of combustible materials are dangerous. Fire in its various forms, without flame and with flame, and whether employed for heating or lighting, is dangerous. Open fire places, enclosed stoves, heating by air and water, ovens and furnaces, gas-lights, lamps, candles, and lucifer matches, are dangerous. Who, in his right senses, will deny this? But, with as many dangerous materials and dangerous processes about us, the world has gone on; and the accidents, costly and calamitous as some of them have been, are comparatively few in number.

In the use of heating and light-giving materials, and in their application to the innumerable processes of trade, manufactories and social life, what is it which constitutes immunity from accidents? Is it not because some of the materials are more easily managed than others? In themselves they are as dangerous, but in their application, the elements of safety greatly outnumber those of danger. In actual every day practice, it is next to an impossibility to derange or interrupt the successful operations of some kinds of combustible materials, whilst others are at any moment liable to go wrong, and, with the most attentive supervision they often do go wrong.

In helping to promote the use of gas, the question uppermost in our thoughts, during thirty years, has been, not whether gas is dangerous but whether, in its right application, it is attended with fewer risks of accident, than any other material? This question has long been settled. We believe it to be impossible to ever estimate the benefits of gas, when comparing, or rather contrasting, it with other light-giving materials, and solely on the principle of safety. If all the ordinary kinds of light-giving substances are more or less dangerous, is it not reasonable, as well as desirable, to make a selection? This has been done. The public—manufactures, commercial, social—have declared in favor of gas; and to an extent which probably will never be, even approximately, represented by figures. What avails it to try to resuscitate old-fashioned and obsolete prejudices? Who will listen to them, or who will believe in them?

Gas-lighting must not be looked on hastily, nor only in its commonest and most familiar aspect, if we would come to a right conclusion as to its superiority in respect to safety. A good and well regulated shop, or warehouse, or manufactory, or printing office, or private dwelling, is an example of the advantages of gas, under favorable conditious. In passing along the streets, the thousands of burners of various forms and sizes, which are seen so closely mixed up with fragile and combustible materials, may seem to convey a notion of danger. But it is not so. Accidents from such causes are extremely rare. Practice and experience may be relied on. The risks are smaller than they appear to be.

Those who magnify, or, as we ought to say, exaggerate, the danger of gas-lighting, should dive below the levels of the streets and witness what is going on in cellars, workshops and warehouses, where the floors are strewed with paper, straw and shavings, and every available place filled with bales, boxes and casks; whose contents in many instances are as inflammable, and a hundred times as dangerous as the gas which illuminates them. Then it may be as well to remember the class of persons to whose care and management gas lights are entrusted; and what a continuous stream of young and inexperienced persons is daily flowing toward the metropolis and all the large cities and towns in the kingdom. Many of these have, in a few days and sometimes in a few hours, to take care of their masters' and mistress' property, and to light and put out the gas although they may never have done so before.

If further proof be needed that gas-lighting is not dangerous, let us think of the pile of buildings in the manufacturing districts and the processes carried on in them; where the number of burners and the gas consumed in one of them are equal to what are required in a moderate sized town. We may also try to think of the probable number of burners, the thousands of millions of cubic feet of gas, and the quantity of light obtained from it, and then we may ask where the tallow, or oil, or other materials are to be obtained to supply its place with light so pure, so healthy, so cheap, and so free from danger.

THE BUTTER POWDER SWINDLE.

We have been frequently importuned by our readers to inform them of the merits or *demerits* of the butter powder so largely advertised, which it is claimed will "make a *pound* of butter out of a *pint* of milk." The simple statement is enough to condemn the thing, but cupidity and credulity too often give sharpers the advantage, and they sell rights for the use of butter powder, and the victim too late becomes a wiser, a sadder, and a poorer man.

The following is the best *expose* of the fraud we know of, and will show how the fraud is committed and then how to expose it.

To commit the fraud, take a pound of butter, a proportion of the so-called butter powder and a pint of milk, beat and crush them together, and they will seemingly unite. The powder which is used forms an emulsion with the milk and the butter, and the result is a mass looking like butter, and tasting like cheap butter. Now, to suppose that the result is butter is simply folly. But if you doubt the fact put the result of what you manufacture into a vessel standing in boiling water until the contents melts; then add some warm water and leave it at rest for a while in a melted warm state, and you will find your original pound of butter floating on the top, and the balance of the quantity, being about a pound of humbug, separated from the other in white water and curds, with occasionnally a small quantity of white powder at the bottom. You will, of course, find the proceeds increased by the water you have added.

This is a most mischievous fraud, and will ruin

many a farmer's credit. Municipal authorities and magistrates will have an "assize of butter" at their markets; the article will be forfeited, and the fraudulent farmer exposed, and most likely punished for swindling.

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The Iron Works of this firm, with the necessary outbuildings and fixtures cover a space of about fifteen acres, and give employment to about 400 hands. The works consume from 6,000 to 8,000 tons of coal per annum. The pig iron used per annum for castings amounts to 15,000 tons, and also 1,000 tons of wrought and sheet iron is otherwise employed.

This will give some idea of the extent of the business and the amount of capital necessarily invested in this peculiar industry.

These gentlemen have erected gas works in almost every quarter of the Union, including some of our largest cities, and are therefore too well and favorably known to the gas fraternity to require any further notice from us. Their advertisement will be found in another column.

Answers to Correspondents.

H. J., of Ohio.—If an invention has been in use in your town for five years, a valid patent could not be obtained for it—you can continue the use of the invention without danger of molestation. We thank you for your efforts to increase the circulation of our paper.

J. McE., of Baltimore.—The missing numbers have been sent. There is evidently great carelessness somewhere in the Post Office, for we take great care in seeing that subscribers' numbers are securely put in wrappers and legibly directed on leaving our office.

P. M. G., of Ill.—We should be afraid of a boiler carrying the pressure you mention. In the hand of some engineers it would be perfectly safe; but take them in general it is better to be on the safe side, and to run it with a lower pressure.

J. A. B., of Mo.—India-rubber will not stand the action of coal gas any length of time. The hydrocarbon vapors which all coal gas contain act to dissolve the gum. Vulcanized rubber and gutta percha are not so readily acted upon.

N. A., of Mass.—Carbonic acid gas is heavier than atmospheric air. It is a mistake, however, to suppose it will form a stratum next to the earth. It cannot be, owing to a peculiar property which gases of different densities have of mixing together.

S. A. L., of N. Y.—There can be no lime or potash in steam. The purest water is obtained by distillation condensing steam.

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It yields 10,996 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

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GLOUCESTERCITY, CAMDEN COUNTY, N. J.,

MANUFACTURE

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STOPVALVES FOR GAS OR WATER,

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Parties owning small Gas Works, who are willing to have tested, after the test the addition will be sold or removed free of cost, will please communicate with the proprietors of this Journal.

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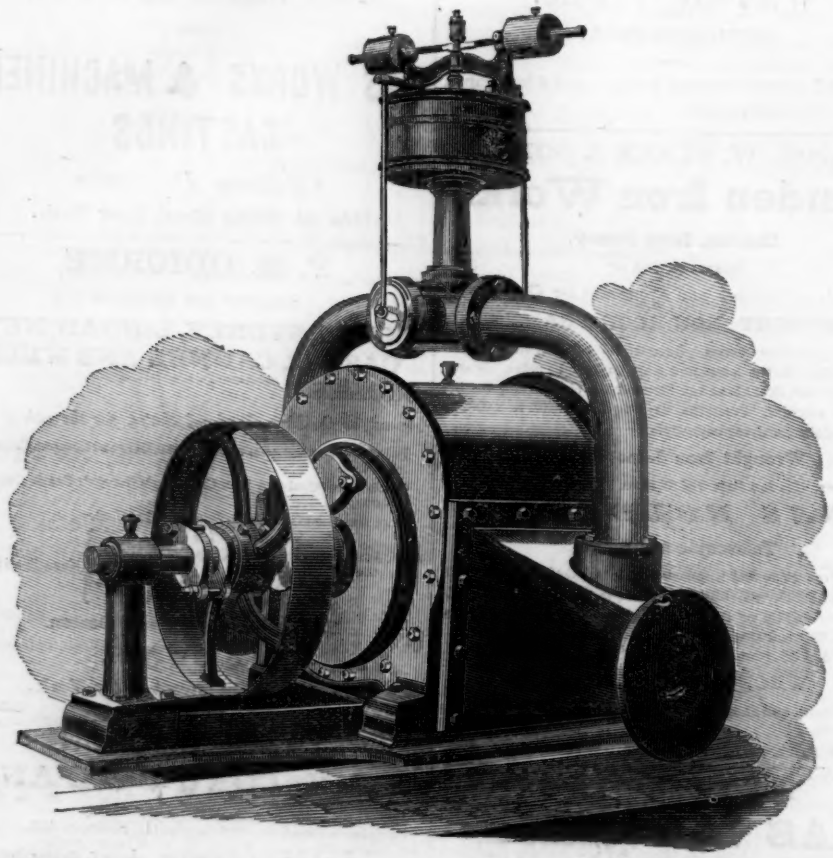
The Mackenzie Patent Gas Exhauster, AND PATENT COMPENSATOR.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, eitheclay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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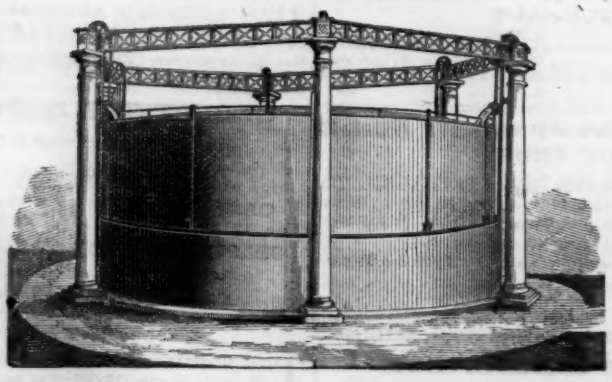

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Particular attention paid to Alterations and Repairs.

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Make Valves ½-inch to 24 inch, for Water, Steam & Gas.

FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

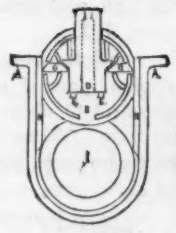

FIG. 3.

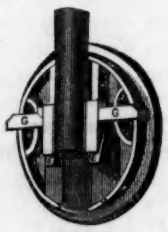

FIG. 2.

[From A. F. Havens, Engineer Brooklyn Gas-Light Co.]

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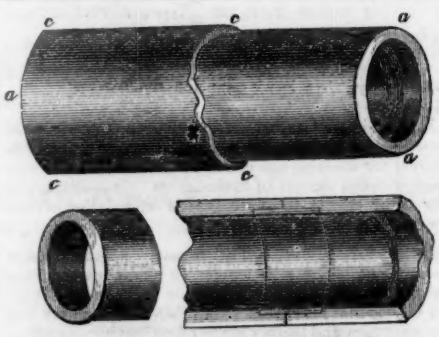

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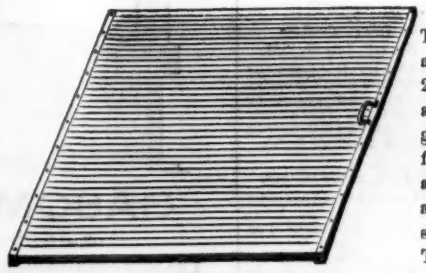

☞ The advantages of these Trays over those made of iron, are economy (they being over 200 per cent cheaper than iron, and will last twice as long), a greatly increased purifying surface, and a saving of time and and labor in removing the lime, as it does not adhere to the smooth surface of the Wood Trays, as is the case with the iron. JOHN L, CHEESMAN, 147 and 149 Avenue C., New York.

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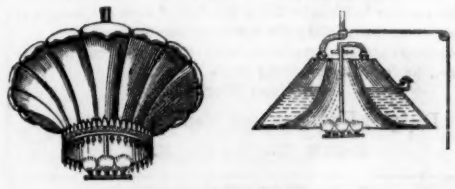

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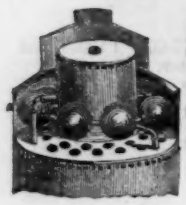

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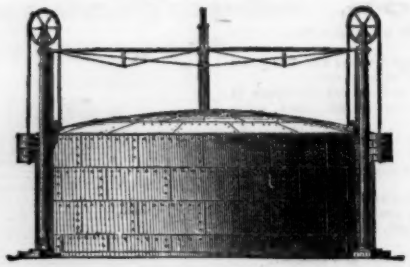

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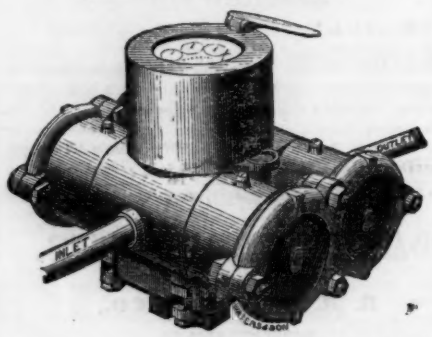

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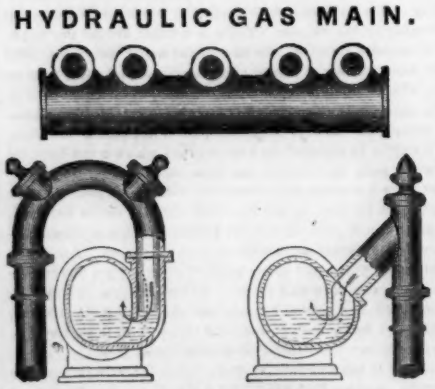

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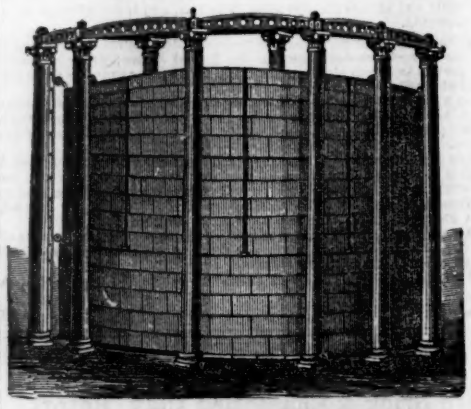

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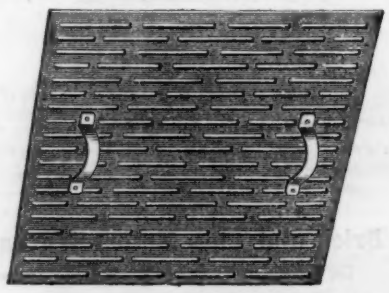

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Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

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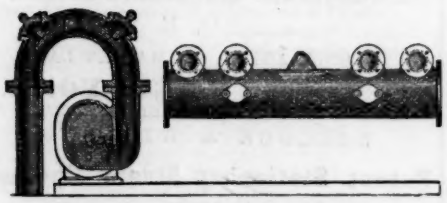

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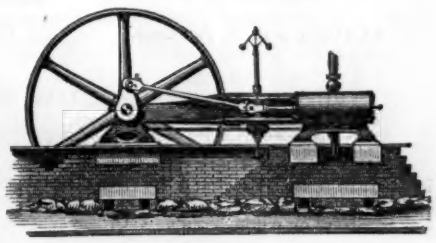

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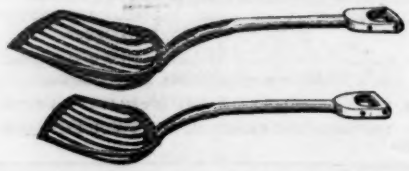

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Arnold's Metallic Gas Trays—T. G. Arnold, 334 and 336 West 21st street, N. Y. 6
American Meter Company, 512 West 22d street, New York 8
Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the AMERICAN GAS-LIGHT JOURNAL 7
American Self Gas Lighting Torch and Improved Key—J. W. Bartlett, 569 Broadway, N. Y. 3
Builder of Gas Works, Apparatus, Etc.—P. P. Delly, 39 Laurel street, Philadelphia 2
Cambridge Gas Stoves, Ranges, &c.—Gas Light Journal Offices, 8
Contractors for Gas-Works, Etc.—Murray, Baker & Walker, Fort Wayne, Ind 9
Gas Retorts, Etc.—George C. Hicks & Co., Baltimore, Md 9
Gas Fixtures, Etc.—Archer & Pancoast Manufacturing Co., 9, 11 and 13 Mercer street, New York 2
Gas Fitters' and Plumbers' Materials—McNab & Harlin, 86 John street, New York 3
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York 8
Gas Engineers and Contractors—Hoy, Kennedy & Co., 111 Liberty street, New York 4
Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa 9
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry street, Philadelphia, Pa 8
Gas Apparatus, &c.—Geo. H. Kitchen & Co., 561 Broadway 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. 9
Gas Stoves—A. L. Bogart, 792 Broadway 7
Gas Fixtures & Chandeliers—Alfred Bliss & Co., 95 Bleecker-st., New York 4
Gasometers, Etc—George Stacey & Co. Cincinnati, O 6
Gas-works of London—D. Van Nostrand, 192 Broadway 8
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway 3
Gasholders, Etc.—Delly & Fowler, 39 Laurel street, Philadelphia 2
Hydrocarbon Light and Gas Improvement Company, Office 74 Maiden Lane, New York 5
Jersey City Gas Meter Works. 14 Morris st., Jersey, N. J 5
Ludlow Valve Mf'g Co., 139 River street, Troy, N. Y 3
Patent Gas Exhauster—Smith & Sayre, 484 Broadway 4
Portable Gas Works—Covell & Co., 554 Broadway, New York .. 2
Purification of Gas by Oxide of Iron—W. H. St. John and Peter Cartwright, N. Y. Gas Works, 21st Street and Av'e A 3
Stanley's Hydraulic Main, Etc.—L. F. Whiting, Boston 6
Springfield Gas Machine—Gilbert & Barker, 90 Crosby street New York 3
Valve Gas Burner—Avery & Co., Springfield, Mass 3
West Fairmount Gas Coal Mines, Office, Baltimore Md 9
Wooden Gas and Water Pipe—Wyckoff Bros. & Co., Elmira 3

FOUNDRIES.

Brooklyn Tube Works—B. T. Benton, Brooklyn 9
Columbian Iron Works—Wm. Taylor & Sons, 11, 13 and 15 Adams street, Brooklyn, N. Y 7
Cast Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md 1
Continental Works—T. F. Rowland, Greenpoint 6
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons ... 3
Erie Basin Iron Works—Elizabeth, Dwight and Van Dyke sts., South Brooklyn, N. Y 6, 7
Gloucester Iron Works, Camden, N. J 3
Keystone Iron Works 3
Louisville Pipe Works—Dennis Long, Cor. 9th and Water-sts., Louisville, Ky 2
Manufacturing Enamelers—Nessle & Taylor, 97 Water street, Brooklyn, N. Y 7
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smaliman and Wilkins streets, Pittsburgh, Pa 4
Oregon Iron Foundry—Herring & Floyd, 738, 740, 742 and 744 Greenwich street, New York 8
Pascal Iron Works—Morris, Tasker & Co., Philadelphia, Pa.... 9
Southwark Foundry—Merrick & Sons, Fifth and Washington streets, Philadelphia 9
Wrought Iron Pipes, etc.—Joseph Nason & Co., 61 Beekman street, New York 4

WATER METERS, PUMPS, ETC.

Ashcroft's Low-water Detector, 50 John street, New York 6
Aubin Water Meter—H. Q. Hawley, Albany, N. Y 9
Babcock & Wilcox's Stationary Steam Engines 8, 9
Davis' Steam Superheating Boiler—Duplex Steam Boiler Mf'g Company, Long Island City, N. Y 9
Steam Pumps—H. R. Worthington, 61 Beekman st. New York .. 7
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 139 River street, Troy, N. Y 3
Water Pipes, etc.—S. Fulton & Co. 207 North Water st Phila.... 9
Water Closets, etc.—Wm. S. Carr & Co. 149, 151, 153, 155, 157 Centre street, New York 8
Worthington's Water Meters—H. R. Worthington, 61 Beekman street, New York 6

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, Etc., 58 Goerck street, New York 5
Bay State Clay Retort Works, 125, 127 Water st. Boston, Mass.. 6
Brooklyn Clay Retort Works, Van Dyke st. Brooklyn, N. Y..... 5
Jersey City Fire Brick Works.—J. H. Gautier & Co., Greene, Essex and Bergen streets, Morris Canal Basin, N. J 5
Laciede Fire Brick Works, 1007 North Levee, St. Louis, Mo..... 3
Manhattan Clay Retort Works, 15th st. near Av. C, New York... 5
Philadelphia Fire Brick Works, Vine and 23d sts. Philadelphia.. 5
Retorts, Pipes, &c.—R. D. Wood & Co., 400 Chestnut street, Philadelphia 9

MINING MACHINERY, ETC.

Broker in Mining Stocks—C. H. Smith 145 B'way, New York 4
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Mining Engineer—J. H. Tiemann, 240 Pearl st. New York..... 8
Sodium Amalgam &c.—Prof. Wurtz, 26 Pine st., New York..... 6
School of Mines, Columbia College, East 49th st. " 2

LAMPS, STOVES, PETROLEUM, ETC.

Lamps—F. H. Lovell & Co 238 Pearl street, New York 7
Street Lamps—J. G. Miner, Morrisania, Westchester Co., N.Y.. 2
Lamps, &c.,—Julius Ives & Co., 49 Maiden Lane, N. Y 9

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Cameron Coal Company—42 Broadway 1
Despard Coal 1
Engineers and Contractors—R. M. Fryer & Co., 296 Broadway, New York 3
Empire Sewing Machine Company, 294 Bowery 6
Finkle & Lyon Sewing Machine Company, 581 Broadway 9
Fodell's "Book-keeping for Gas Companies" 3
Gas-Light Journal American and Foreign Patent Agency 8
Opposition S. S. Line to California—177 West st., cor. Warren... 9
Professor Henry Wurtz—Office Gas-Light Journal 3
Prince's Metallic Paint—D. Sloan & Co. 115 Liberty street..... 5
Patent Lamp Post—Am. Gas-Light Journal, 28 Pine street.... 4
Pianos—Raven & Bacon, 644 and 646 Broadway, N. Y 9
Smedberg's "Synopsis of Gas-Lighting" 2
Tabbaton's Patent Screening Shovels—A. T. Smithe, No. 126 Maiden Lane, New York city 8
Smith & Sayre Manufacturing Company, 95 Liberty street..... 5
Shackelton's System of Heating—22 Pine-st., Room 10, N. Y... 3
The Newburgh Orrel Co-l Company—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7 3
Treatise on the Manufacture of Gas—D. Van Nostrand, 192 Broadway, New York 9
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